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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/002,979	12/06/2001	Satoshi Maruyama	216935US0	4984
22850	7590	04/03/2008		
OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314				
EXAMINER				
CANTELMO, GREGG				
ART UNIT		PAPER NUMBER		
1795				
NOTIFICATION DATE		DELIVERY MODE		
04/03/2008		ELECTRONIC		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary

Application No.

10/002,979

Applicant(s)

MARUYAMA ET AL.

Examiner

Gregg Cantelmo

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 January 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 17, 18 and 21-30 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 17, 18 and 21-30 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/S508)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Response to Amendment

1. In response to the amendment received January 10, 2008:
 - a. Claims 17, 18 and 21-30 are pending;
 - b. The previous 112 rejection has been overcome in light of the amendment;
 - c. The rejections have been withdrawn in light of the amendment specifying the electrolyte is a polymer-based solid electrolyte.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 18 and 21-25 are rejected under 35 U.S.C. 102(b) as being anticipated by JP 2000-138075 (JP '075).

JP '075 discloses a lithium secondary battery comprising a graphite electrode, a gel-like solid polymer electrolyte and a lithium cobalt composite oxide electrode wherein the composite oxide electrode includes niobium in an amount ranging from 0.0001 to 0.05 and preferably 0.001 to 0.03 (abstract and claim 1 as applied to claims 21-23 and 18).

While the abstract names the cathode as the graphite material and the anode as the lithium cobalt composite oxide materials, one of ordinary skill in the art would recognize that the electrodes of JP '075 are identical to those materials in the instant

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application and that each electrode functions as either an anode or a cathode depending on whether the rechargeable cell is operating in a discharge mode or charge mode. In addition a review of the machine translation of JP '075 reveals that the positive active material (i.e. the cathode) is the composite oxide and the negative electrode is the carbon material (para. 16).

The anode is a carbonaceous material (para. 16 as applied to claim 24).

The electrolyte can be a gelled electrolyte (abstract and para. 24 as applied 25).

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

3. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP '075 as applied to claim 21 above, and further in view of either Yoshino, of record or Liu, of record.

JP '075 teaches that the cathode active material is mixed with a fluoro-resin binder (para. 16).

The difference not yet discussed is of the cathode including a poly(vinylidene fluoride) binder.

Use of poly(vinylidene fluoride) cathode binders is well known art-recognized binder material for lithium battery active materials.

Lithium cathode are known to include pvdf binder (Yoshino col. 19, ll. 1-20 as applied to claim 17). Liu discloses that using the pvdf binders therein provides for a product having good physical properties and excellent conductive properties (abstract).

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP '075 by selecting the binder to be a pvdf binder as taught by Liu since it would have provided an electrode having good physical properties and excellent conductive properties. The selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945) See also *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960). MPEP § 2144.07.

4. Claims 26-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP '075 as applied to claim 25 above, and further in view of Periasamy et al. "Studies on PVdF-based polymer gel electrolytes" (hereafter referred to as Periasamy).

JP '075 recognizes that a variety of polymer based electrolyte materials can be used in combination with the cathode material disclosed therein. Electrolyte materials include a fluorine polymer system such as polyvinylidene fluoride and a lithium salt (para. 24).

The differences not yet discussed are of the thickness of the electrolyte (claims 26-28) or of the polymer electrolyte being a homopolymer of poly(vinylidene fluoride) (claim 29).

While JP '075 does not disclose the thickness of the electrolyte, selection of such would have been well within the skill of the ordinary worker in the art. Generally, differences in ranges will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such ranges is critical. In re Boesch,

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617 F.2d 272, 205 USPQ 215 (CCPA 1980). In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969).

Use of gel polymer electrolytes in the claimed thickness ranges is further taught by Periasamy which teaches of using lithium cobalt oxide cathodes in combination with a PVdF-based gel polymer electrolyte having a thickness of 50 micrometers (abstract and section 2. Experimental as applied to claims 26-29).

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP '075 to use a homopolymer of PVdF as taught by Periasamy since it would have provided a solid polymer electrolyte system having high ionic conductivity, good mechanical stability, a wide electrochemical stable window and a stable lithium interface. The selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in Sinclair & Carroll Co. v. Interchemical Corp., 325 U.S. 327, 65 USPQ 297 (1945) See also In re Leshin, 227 F.2d 197, 125 USPQ 416 (CCPA 1960). MPEP § 2144.07. In using the PVdF gel-based electrolyte of Periasamy, one of ordinary skill in the art would have further appreciated employing an electrolyte thickness of about 50 microns which reasonably encompasses or suggests the thickness ranges of claims 26-28. Generally, differences in ranges will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such ranges is critical. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969). It has been held that when

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the difference between a claimed invention and the prior art is the range or value of a particular variable, then a prima facie rejection is properly established when the difference in the range or value is minor. Titanium Metals Corp. of Am. v. Banner, 778 F.2d 775, 783, 227 USPQ 773, 779 (Fed. Cir. 1985).

5. Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP '075 in view of Periasamy as applied to claim 29 above, and further in view of Humphrey of record.

The difference not yet discussed is of the PVdF polymer being produced by an emulsion polymerization process.

With respect to a PVdF polymer obtained from emulsion polymerization: Humphrey discloses an electrode composition comprising a PVdF homopolymer (abstract and col. 5, II. 9-43). The PVdF is preferably formed by emulsion polymerization to provide for a high-purity polymer.

The motivation for employing a PVdF homopolymer obtained by emulsion polymerization is it that it would have provided a higher purity polymer.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP '075 in view of Periasamy by employing a PVdF homopolymer obtained by emulsion polymerization since it would, have provide a higher purity polymer.

Claim Rejections - 35 USC § 103

6. Claims 18 and 21-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Periasamy in view of JP '075.

Periasamy discloses a lithium secondary battery comprising an anode, cathode and PVdF-based gel polymer electrolyte (abstract and experimental as applied to claims 21, 25 and 29). The cathode is a lithium cobalt oxide material.

The electrolyte has a thickness of 50 micrometers (section 2.1 as applied to claims 26-28). In using the PVdF gel-based electrolyte of Periasamy, one of ordinary skill in the art would have further appreciated employing an electrolyte thickness of about 50 microns which reasonably encompasses or suggests the thickness ranges of claims 28. Generally, differences in ranges will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such ranges is critical. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969). It has been held that when the difference between a claimed invention and the prior art is the range or value of a particular variable, then a prima facie rejection is properly established when the difference in the range or value is minor. Titanium Metals Corp. of Am. v. Banner, 778 F.2d 775, 783, 227 USPQ 773, 779 (Fed. Cir. 1985).

Regarding the additional subordinate element in the claimed lithium cobalt oxide (claims 18 and 21-23):

Periasamy does not teach of the lithium cobalt oxide material having a subordinate element M added in an amount of 0.001 to 2 at% relative to the cobalt (claim 21) wherein M can be Nb (claims 22 and 23) and Nb is present in an amount of 0.001 to 0.1 at% (claim 18).

JP '075 discloses a lithium secondary battery comprising a graphite electrode, a gel-like solid polymer electrolyte and a lithium cobalt composite oxide electrode wherein the composite oxide electrode includes niobium in an amount ranging from 0.0001 to 0.05 and preferably 0.001 to 0.03 (abstract and claim 1 as applied to claims 21-23 and 18).

While the abstract names the cathode as the graphite material and the anode as the lithium cobalt composite oxide materials, one of ordinary skill in the art would recognize that the electrodes of JP '075 are identical to those materials in the instant application and that each electrode functions as either an anode or a cathode depending on whether the rechargeable cell is operating in a discharge mode or charge mode. In addition a review of the machine translation of JP '075 reveals that the positive active material (i.e. the cathode) is the composite oxide and the negative electrode is the carbon material (para. 16 as applied to claims 21, 22, 23 and 18).

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Periasamy by adding niobium to the lithium cobalt oxide material in an amount of 0.0001 to 2at% relative to cobalt and further in an amount of 0.001 to 0.1at% as taught by JP '075 since it would have increased the operation voltage, improved the low temperature characteristic and safety of the battery.

Regarding the anode material (claim 24):

Periasamy appears to use a Li/LiCoO₂ combination (section 2.4) wherein lithium is the anode material.

One of ordinary skill in the art would have readily appreciated that while Periasamy uses a lithium anode material, the use of alternative negative electrode materials, including carbonaceous materials, would have been obvious alternative anode materials useful in lithium secondary batteries.

JP '075 teaches using carbonaceous anode materials (para. 16). Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Periasamy by replacing the lithium anode material with a carbonaceous material since such alternative materials are recognized alternative anode active materials used in lithium secondary batteries. Furthermore the use of carbon over lithium is understood in the art to improve the safety of the battery by avoiding the use of the highly reactive lithium material. The selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945) See also *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960). MPEP § 2144.07.

7. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Periasamy in view of JP '075 as applied to claim 21 above, and further in view of either Yoshino, of record or Liu, of record.

The difference not yet discussed is of the cathode including a poly(vinylidene fluoride) binder.

Use of poly(vinylidene fluoride) cathode binders is well known art-recognized binder material for lithium battery active materials.

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Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Periasamy in view of JP '075 by selecting the binder to be a pvdf binder as taught by Liu since it would have provided an electrode having good physical properties and excellent conductive properties. The selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945) See also *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960). MPEP § 2144.07.

8. Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Periasamy in view of JP '075 as applied to claim 29 above, and further in view of Humphrey of record.

The difference not yet discussed is of the PVdF polymer being produced by an emulsion polymerization process.

With respect to a PVdF polymer obtained from emulsion polymerization: Humphrey discloses an electrode composition comprising a PVdF homopolymer (abstract and col. 5, ll. 9-43). The PVdF is preferably formed by emulsion polymerization to provide for a high-purity polymer.

The motivation for employing a PVdF homopolymer obtained by emulsion polymerization is it that it would have provided a higher purity polymer.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Periasamy by employing a PVdF homopolymer obtained by emulsion polymerization since it would, have provide a higher purity polymer.

Response to Arguments

9. Applicant's arguments with respect to claims 17, 18 and 21-30 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

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11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gregg Cantelmo whose telephone number is 571-272-1283. The examiner can normally be reached on Monday to Thursday, 8:30-6:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Gregg Cantelmo/
Primary Examiner, Art Unit 1795